

### REMARKS

Claims 44-97 are pending in the present application. Claims 49, 72, and 77 have been amended. Claims 95-97 have been added.

Claims 44-94 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 3,386,876 (“Wyckoff”), or, in the alternative, under 35 U.S.C. § 103(a) as unpatentable over Wyckoff. Applicant respectfully traverses this rejection.

Claim 44 recites a geogrid made by “stretching and uniaxially orienting a plastics starting material which was provided with an array of holes, the geogrid comprising transverse bars interconnected by substantially straight oriented strands, at least some of the strands extending from one bar to the next at a substantial angle to the direction at right angles to the bars and alternate such angled strands across the width of the geogrid being angled to said direction by equal and opposite angles, the orientation of the angled strands extending into the bars.”

Wyckoff does not disclose all the limitations of claim 44. Wyckoff does not disclose “the orientation of the angled strands extending into the bars,” as recited in claim 44. The effect of this feature can be seen in the upper part of Figure 2 of the present application and is described in the passage beginning on the second last line of page 13 of the specification. The orientation begins at the narrowest parts of the strand-forming zones 5 (i.e., in this example, in the centers of the eventual strands 6) and progresses along the strands. This can be demonstrated by pulling a strip of, say, HDPE (high density polyethylene) out by hand at room temperature, when the orientation initiates at the narrowest part and progresses in each direction along the strip. Having the orientation extend into the bars increases the strength of the product, increases the size of the product (i.e., reduces the weight per unit area), and reduces the long-term creep of the product.

Wyckoff strongly cautions against allowing the orientation to pass across the “draw-line.” In Figure 5, Wyckoff shows that the draw-line terminates well short of the bar, and is in fact the 45 degree line which could be drawn in Figure 1. Wyckoff at column 2, line 72, states:

Once the maximum allowable stretch is induced in each of such ribs, the line defining the end of a drawn rib, hereafter referred to as the ‘draw-line,’ will have approximately the maximum length possible without having the juncture between the ends of adjacent ribs stretch and without having the draw-line of one rib interfere or cross with the draw-lines of other ribs at such juncture.

Wyckoff describes various numerical conditions and values a number of times to buttress his position that allowing the orientation to extend into the bars should be actively avoided. Wyckoff is concerned with avoiding failure of the stretch film structure with very small increases in orientation. Thus, Wyckoff *teaches away* from doing what is required in claim 44, which recites “the orientation of the angled strands extending into the bars.” Furthermore, Wyckoff warns that if the draw in the Wyckoff structure were increased, there would be a risk of failure of the stretched structure.

Since Wyckoff does not disclose or suggest all the limitations of claim 44, Wyckoff does not anticipate or render obvious claim 44 or dependent claims 45-49, 87, and 90. Accordingly, Applicant respectfully requests that the rejection of claims 44-49, 87, and 90 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

Claim 50 recites a geogrid made by “stretching and biaxially orienting a plastics starting material which was provided with an array of holes,” the geogrid comprising “a first set of substantially straight oriented strands extending at an acute angle to a first direction; a second set of substantially straight oriented strands extending at an acute angle to the first direction and, as considered in a second direction at right angles to the first direction, alternate (angled) strands of the two sets being angled to the first direction by substantially equal and opposite angles; further substantially straight oriented strands

extending in said second direction; and junctions each interconnecting four of the angled oriented strands and two of the further oriented strands, at substantially each junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.”

Wyckoff does not teach or suggest all the limitations of claim 50. Specifically, Wyckoff does not teach or suggest that the orientation should run around the crotch and that there should be “continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand,” as recited in claim 50. The effect of this feature is shown in Figure 4 of the present application, best illustrated in the upper part of the drawing, and is described in the second full paragraph of page 15 of the specification. Because the orientation has been taken into the bar 6' in the first (MD) stretch, by taking the orientation into the junction 11 in the second (TD) stretch, the orientation runs right around the crotches between the strands 6, 9. This significantly increases the strength of the biax material because the orientation runs at right angles to any potential split lines between the strands and in a direction to contain and resist any splitting force tending to pull adjacent strands apart at the junctions 11. As discussed above, the extra orientation has the additional benefit of reducing the weight per unit area of the product and decreasing the long-term creep of the product.

In contrast, Wyckoff stops stretching before the orientation reaches the junctions between strands 51, 53 (Figure 10) so that there is no possibility of the orientation continuing around the crotches and from the edge of one strand to the edge of the adjacent strand. Again, as discussed above, Wyckoff *teaches against* taking the orientation this far in order to protect the structure.

Since Wyckoff does not disclose all the limitations of claim 50, Wyckoff does not anticipate claim 50 or dependent claims 51-57, 88, and 91. Wyckoff also does not teach or suggest all the limitations of claim 50 and thus does not render claims 50 and its

dependent claims obvious. Accordingly, Applicant respectfully requests that the rejection of claims 50-57, 88, and 91 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

Claim 58 recites a method of making a uniaxially oriented plastics material geogrid including limitations similar to claim 44, such as “providing a plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so that substantially each hole is at a corner of each of three hexagons, there being within the hexagon no holes of a size greater than or equal to the size of the first mentioned holes” and “applying a stretch to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form oriented strands from such zones, thereby forming a structure having bars at right angles to the direction of stretch, interconnected by the oriented strands, the stretch being applied to such an extent that the orientation of the strands extends into the bar.”

For the reasons set forth above with regard to claim 44, claim 58 is also submitted to be patentable over Wyckoff. For example, Wyckoff does not teach or suggest “the stretch being applied to such an extent that the orientation of the strands extends into the bar,” as recited in claim 58. In fact, Wyckoff *teaches away* from such a limitation and warns that if the draw in a Wyckoff structure were increased, there would be a risk of failure of the stretched structure. Accordingly, Wyckoff does not teach or suggest all the limitations of claim 58.

Since Wyckoff does not disclose or suggest all the limitations of claim 58, Wyckoff does not anticipate or render obvious claim 58 or dependent claim 59. Accordingly, Applicant respectfully requests that the rejection of claims 58 and 59 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

Claim 60 recites a method of making a biaxially oriented plastics material geogrid including limitations similar to claim 50, such as “providing a plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so

that substantially each hole is at a corner of each of three hexagons, there being within the hexagon no holes of a size greater than or equal to the size of the first-mentioned holes; applying a stretch in a first direction to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form oriented strands from such zones; and applying a stretch in a second direction substantially at right angles to said first direction to stretch out strand-forming zones between adjacent holes on the sides of the hexagons and form oriented strands from the latter zones, whereby centre portions of the hexagons form junctions interconnecting the oriented strands, the stretching being applied to such an extent that the orientation of the strands extends into substantially each junction so that at substantially each junction, the crotch between each pair of adjacent strands is oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.”

For the reasons set forth above with regard to claim 50, claim 60 is also submitted to be patentable over Wyckoff. Specifically, as discussed above, Wyckoff does not teach or suggest that “the orientation of the strands extends into substantially each junction so that at substantially each junction, the crotch between each pair of adjacent strands is oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand,” as recited in claim 60. Indeed, as discussed above, Wyckoff *teaches away* from this feature of the invention.

Since Wyckoff does not disclose or suggest all the limitations of claim 60, Wyckoff does not anticipate or render obvious claim 60 or dependent claims 61-69. Accordingly, Applicant respectfully requests that the rejection of claims 60-69 under 35 U.S.C. § 102(b)/ 103(a) be withdrawn.

Claim 70 recites a method of making a plastics metal mesh structure including “providing a plastics sheet starting material which has holes in a regular pattern, which

holes define potential strand-forming zones extending between respective holes and which on stretching the starting material in one direction would stretch out to form oriented strands; *forming depressions in and thereby weakening some but not all said potential strand-forming zones* without material removal when the plastics material is at a temperature below the lower limit of its melting range, said depressions defining a regular pattern; and applying a stretch in said direction so that the weakened potential strand-forming zones form oriented strands but the non-weakened potential strand-forming zones do not form oriented strands though some stretch may be applied thereto and whereby the mesh structure so produced is not that that would be produced from the starting material without said depressions.” (Emphasis added).

Wyckoff does not teach or suggest all the limitations of claim 70. In fact, Wyckoff is entirely silent on providing additional depressions which weaken some, but not all, of the potential strand-forming zones. Since Wyckoff does not disclose or suggest all the limitations of claim 70, Wyckoff does not anticipate or render obvious claim 70 or dependent claims 71-74. Accordingly, Applicant respectfully requests that the rejection of claims 70-74 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

Claim 75 recites a method of making an oriented plastics material geogrid comprising, *inter alia*, “providing a plastics sheet starting material which has holes on a rectangular grid whose axes extend in a first direction and in a second direction substantially at right angles to the first direction, thereby providing first rows of holes extending in the first direction and second rows of holes extending in the second direction, and which starting material has weakened zones between alternate pairs of adjacent holes in each first row, the weakened zones being staggered as between adjacent first rows so that a weakened zone in one first row is adjacent a non-weakened zone in the adjacent first row on either side,” “applying a stretch in the first direction to stretch out strand-forming zones between adjacent holes in each second row to form oriented strands from such zones,” and “applying a stretch in the second direction to stretch out the weakened zones

to form oriented strands from the weakened zones without stretching out non-weakened zones between adjacent holes of the first rows to the same extent as the weakened zones are stretched.”

Wyckoff does not disclose or suggest all the limitations of claim 75. In particular, Wyckoff is wholly silent on providing staggered weakened zones between alternate pairs of adjacent holes in the first rows, and stretching out the weakened zones. Since Wyckoff does not teach or suggest all the limitations of claim 75, claim 75 and dependent claim 93 are patentable over Wyckoff. Accordingly, Applicant respectfully requests that the rejection of claims 75 and 93 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

Claim 76 recites a method of making biaxially oriented plastics material mesh structure having oriented strands which extend at an angle other than 90° to the first and second direction of stretch, comprising “providing a plastics sheet starting material which has holes in a regular array; applying a stretch in a first direction to stretch out respective strand-forming zones between adjacent holes and form oriented strands from such strand-forming zones; and applying a stretch in a second direction substantially at right angles to said first direction to stretch out other respective strand-forming zones between adjacent holes and form further oriented strands from the latter strand-forming zones, whilst applying restraint to the material in the first direction.” Claim 76 further recites “subsequently discontinuing said restraint” and “subsequently allowing the material to relax in the second direction.”

Wyckoff does not teach or suggest the application of restraint to material in the first direction, discontinuing the restraint, and then allowing the material to relax in the second direction. Wyckoff is, in fact, completely silent on such a feature. Since Wyckoff does not teach or suggest all the limitations of claim 76, claim 76 and dependent claim 82

are patentable over the reference. Accordingly, Applicant respectfully requests that the rejection of claims 76 and 82 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

Claim 77 recites a method of making a biaxially oriented plastics material geogrid comprising “providing a plastics sheet starting material which has holes in an array of hexagons of substantially identical shape and size so that substantially each hole is at a corner of each of three hexagons, there being within the hexagon no holes of a size greater than or equal to the size of the first-mentioned holes, the vertices of the hexagons being aligned in a first direction, the vertex pitch of each hexagon being less than the diagonal pitch.” Claim 77 also recites “applying a stretch in the first direction to stretch out strand-forming zones between adjacent holes on sides of the hexagons and form oriented strands from such zones” and “applying a stretch in a second direction substantially at right angles to the first direction to stretch out strand-forming zones between adjacent holes on the sides of the hexagons and form oriented strands from the latter zones, whereby centre portions of the hexagons form junctions interconnecting the oriented strands.”

Wyckoff does not teach or suggest all the limitations of claim 77. In particular, Wyckoff does not teach or suggest and is, in fact, completely silent on providing holes in an array of hexagons, the hexagons having a vertex pitch that is less than the diagonal pitch. Since Wyckoff does not teach or suggest all the limitations of claim 77, claim 77 and dependent claims 78-81 and 94 are submitted to be patentable over Wyckoff. Accordingly, Applicant respectfully requests that the rejection of claims 77-81 and 94 under 35 U.S.C. § 102(b) and 103(a) be withdrawn.

Claim 83 recites a geogrid made by stretching and biaxially orienting a plastics starting material including limitations similar to claims 50 and 60, such as “at least three sets each of at least three spaced, parallel, effectively rectilinear continuous tensile members which extend through the geogrid and each of which comprises an oriented strand, a junction, an oriented strand, a junction, and so on, each junction interconnecting



respective strands of the tensile member and the strands of the tensile member being substantially aligned with each other, the tensile members of each set making an angle with the tensile members of the other sets, and the junctions of one set also functioning as the junctions of the other sets whereby a tensile member of each of the sets intersects at the junction, mesh openings being defined by the tensile members, at substantially each said junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand.”

For the reasons set forth above with regard to claims 50 and 60, claim 83 is also submitted to be patentable over Wyckoff. As discussed above, Wyckoff does not teach or suggest “at substantially each said junction the crotch between each pair of adjacent strands being oriented in the direction running around the crotch, whereby there is continuous orientation from the edge of one strand, around the crotch and to the edge of the adjacent strand,” as recited in claim 83. In fact, as discussed above, Wyckoff *teaches away* from this feature of the invention.

Since Wyckoff does not teach or suggest all the limitations of claim 83, claim 83 and dependent claims 84-86, 89, and 92 are submitted to be patentable over Wyckhoff. Accordingly, Applicant respectfully requests that the rejection of claims 83-86, 89, and 92 under 35 U.S.C. § 102(b)/103(a) be withdrawn.

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In view of the foregoing, applicant submits that the pending application is in condition for allowance, and such action is earnestly solicited.

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Respectfully submitted,

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